User Manual

V1.48

AUTO TEST®

AutoBlast

Ground vibration logger

10242

AUSTRALIAN MADE

AUTO TEST Products Pty Ltd

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1 PRODUCT DESCRIPTION

1.1 Overview

AutoBlast is a ground vibration monitoring and logging device. It measures the ground vibration level using a packet of velocity sensors (geophones) and Air Overpressure level using a microphone. It stores the measurement into a built-in storage memory. The stored data can downloaded to a PC via Bluetooth. It can be configured to perform a sensor check operation before the start of monitoring to make sure the sensors are functioning properly.

AutoBlast can be configured to capture events and raise alarms or notifications. The events can be automatically recorded when the measurement level of the vibration noise exceeds a threshold value (trigger value). At the instance of an event, AutoBlast can raise auxiliary alarms (i.e. light signal or siren) as well as send out notification messages by Email or SMS using the built-in modem.

AutoBlast has an operational battery life of about 10 days. The length of the battery life depends on the capacity of the battery in addition to configurations and the number of events transmitted by the modem.

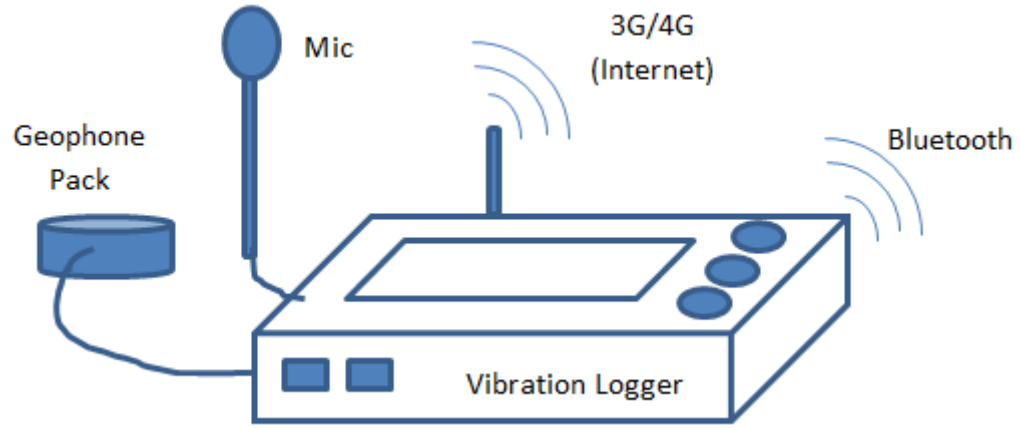


Figure 1. Overview diagram of AutoBlast.

AutoBlast can be interfaced with a PC or a tablet operating on Microsoft Windows. The PC software allows recorded measurement data to be retrieved to the PC. The recorded data can be downloaded via Bluetooth. Alternatively, if AutoBlast is connected to the Internet, the recorded data could also be accessed via the Internet. Once the vibration data is downloaded to the PC, users will be able to view reports of the recorded data on the computer screen. The PC software also allows users to setup the device configurations from a PC. Users can also specify notes (Job no, site information, comments, etc) for each test.

1.2 Applications of AutoBlast

AutoBlast is useful for various applications of Civil Engineering such as industrial vibration monitoring, ground transportation traffic vibration monitoring, construction site monitoring, noise, and vibration monitoring in a blasting zone. It is also useful in the fields of Earthquake Engineering for monitoring the structures of buildings, bridges, and dams.

1.3 List of Accessories

AutoTest AutoBlast is provided with the following list of items:

1. AutoBlast unit
2. Geophone sensor pack
3. Power cable
4. PC software CD

Optional accessories (at extra cost) are listed below:

1. Microphone
2. Visual aid (RED, AMBER) for auxiliary alarms
3. Siren / Speaker for auxiliary alarms
4. Solar panel

1.3.1 AutoBlast unit

The AutoBlast main unit performs the measurement, calculation, and data logging. It includes a LCD screen and three push buttons for user-interface. It can be operated with 1-2 external 12V rechargeable batteries. The external battery pack can be charged using the provided 12V DC charger. The external battery pack can also be charged with a solar panel. A built-in 3G/4G modem allows access to the Internet. It contains an internal flash memory for storing measurement and configuration data. It includes a Bluetooth interface for allowing it to connect to the PC.

1.3.2 Geophone sensor pack

The geophone sensor pack includes a set of three geophone sensors oriented in such a way to make the unit measure 3D vibration levels. The sensors sense vibration levels along Lateral (L), Transversal (T) and Vertical (V) axes. The specifications of the sensor pack are listed in the specification section of this document.

1.3.3 Microphone (Optional)

The AutoBlast microphone is optional and can be used to capture sound wave pressure. The specifications of the microphone are listed in the specification section of this document.

1.3.4 PC Software

The PC software allows access to the measurement data and the configuration data stored on the AutoBlast unit. The software can display the stored data in a printable report format.

The PC software requires Microsoft Windows XP or above and .NET Framework 2.0. A Bluetooth interface is also required on the PC to communicate with AutoTest AutoBlast. The minimum hardware specifications of the PC are listed below:

- 1.8 GHz Processor
- 2 GB RAM
- 10 GB Hard Disk

1.3.5 Accessory wiring information (optional)

Below is a table of pins used for the plugs into the AutoBlast which can be used to attach optional accessories such as a solar panel, manual switch, alarm lights or a speaker.

Connector/Location	Colour	Pin	Function
Top Left 4-pin Female	white	1	Relay NO1
	blue	2	Relay Cmn1
	green	3	Relay NO 2
	yellow	4	Relay Cmn2
Bottom Right 4-pin Male	brown	1	Solar +
	blue	2	Solar -
	red	3	Ex Batt +
	black	4	Ex Batt -
Top Right 4-pin Male	red	1	Charge +
	black	2	Charge -
	purple	3	Rem Sw
	purple	4	Rem Sw

For more details about connecting optional accessories please call our on-site AutoTest Service Team on (03) 8840 3016

2 SETUP & INSTALLATION

The AutoBlast is quick and easy to setup. Take out the AutoBlast unit from the box and connect the vibration sensor. Connect the external battery pack to the dedicated input port on the AutoBlast. Press the ON/OFF key to turn the unit ON.

2.1 Battery charging

The AutoBlast includes a 12V DC charger to charge an external battery pack. Use care when charging the external battery. Never swap the polarity on the battery terminals.

2.2 Software Installation

The PC software can be installed from the supplied CD. In case if the supplied CD is misplaced, the software can also be downloaded from the AutoTest website http://autotest.net.au. To install the software from the CD, insert the CD into the CD/DVD drive of the PC and wait until the PC begins to load the CD. The installation program should start-up automatically once the software CD is inserted into the PC. If the installation program does not start automatically, the setup program can be run by browsing to the CD/DVD directory and the executing ‘Setup.exe’ file.

3 OPERATION

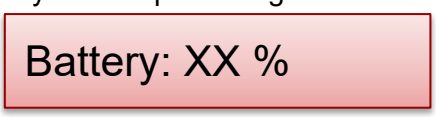
3.1 Input Buttons

AutoBlast contains easy to use interface to configuring and operating. It includes an ON/OFF button and three push buttons to navigate through menus.

Button	Operation
ON/OFF	Turns the unit ON and OFF
Up	Displays the next screen. Increments a value.
Down	Displays the previous screen. Decrements a value.
Enter	Opens the selected menu. Performs acknowledgement.

3.2 Display screens

The LCD screen used in AutoBlast displays various information and status. Use the UP and DOWN keys to switch between different screens. Press ENTER to open a submenu or run a selected command.

Screen	Description
1. Longitudinal[1]	Displays the current value of the longitudinal (L) geophone as x.xx in mm/s or inch/s (depending on the current unit setting). The frequency value is shown as YY in hertz.
2. Transverse[1]	Displays the current value of the transverse (T) geophone as x.xx in mm/s or inch/s (depending on the current unit setting). The frequency is shown as YY in hertz.
3. Vertical[1]	Displays the current value of the vertical (V) geophone as x.xx in mm/s or inch/s (depending on the current unit setting). The frequency is shown as YY in hertz.
4. Air over pressure[1]	Displays the current value of the microphone channel. It displays the current Peak Sound Pressure (PSP) as x.xx in Pascal/PSI/dB (depending on the current unit settings). The frequency is shown as YY in hertz.
5. Date/time	Displays the current date and time of the device
6. Battery	Displays the battery level in percentage 

[1] If the device is not operating in monitoring mode, the display will show “Idle”.

7. IP Address

Displays the IP address of the AutoBlast when connected to the Internet.

8. Modem signal

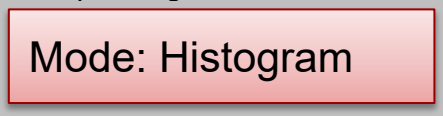
Displays the signal strength of the 3G/4G modem.

If the modem's signal strength value is not available, the screen may display the following messages:

Text	Description
Modem: Finding	When locating a network
Modem: Inactive	When not able to connect to a network. When no SIM card is present
Modem: REMOTE PC	When the 3G/4G modem is connected to the PC via the Internet
Modem: BUSY	When the 3G/4G modem is busy

9. Operating mode

Displays the current operating mode.



10. Status

Displays the current monitor status.

The status is standby, Press OK to start monitoring. Once monitoring is started, Press OK again to stop monitoring.

11. Calibration

Displays the date of the last calibration.

12. Memory

Displays current memory usage

3.3 Configurable Parameters

3.3.1 Modes of operation

AutoBlast has four operating modes that can be configured using the PC software.

Mode	Operation
Waveform	Can capture a waveform of the ground vibration and air overpressure during an event
Histogram	Can continuously record vibration levels at defined intervals. Waveform is not captured during an event
Mix Mode	Waveform events are captured during an event. Histograms are also recorded.
Waveform manual	Can capture a waveform at the instance when the unit is manually triggered

3.3.2 Sampling Rate

AutoBlast can be configured to select the sampling rate from the following list of supported sampling rates.

50, 100, 200, 400, 500, 800, 1000, 1600, 2000 Hz

Note: If the sampling rate is set to 2000 Hz, the maximum fixed recording time for an event waveform is limited to 2.56 sec.

3.3.3 Trigger source

AutoBlast can be configured to select a trigger source during monitoring. The following table lists the trigger sources supported by AutoBlast.

Trigger source	Description
Vibration only	Only the geophone vibration sensors are used
Air-overpressure only	Only the microphone channel is used
Vibration and air-overpressure	Geophone sensors and the microphone are both used
Manual	Manual trigger mode

3.3.4 Trigger level

AutoBlast uses the trigger level as the threshold level for the measurement signal to determine when an event should be recorded. The trigger level can set for the geophone sensors and the microphone.

Channel Type	Trigger level
Vibration	0.13 mm/s to 250 mm/s
Air-Overpressure	100 dB to 145 dB

3.3.5 Recording stop mode

The following table lists the two recording stop modes used by AutoBlast:

Recording stop mode	Description
Fixed time recording	Waveforms recorded during an event have fixed length of time
Automatic recording	Waveform data is recorded during an event until the vibration level settles below the trigger level for more than *AutoWindow* (0.25 s) length of time

If fixed time recording is used, the length of the recorded signal will be 0.25 sec + the value of the fixed recording time specified in the configurations. For example, if the record stop mode is “Fixed time recording” and the value of the fixed recording time is 1 second, the total length of the signal will be 0.25 second (fixed pre-trigger length) + 1 second, which sums up to 1.25 second. The fixed time recording value is limited to 2.56 second when the sampling rate is set to 2000 Hz. However, if the sampling rate is less than 2000 Hz, there is no limit of the recording time.

If the recording stop mode is set to “Automatic recording”, the waveform recording will stop once the measurements are below the trigger level for more than the value of Auto-window (i.e. 0.25 sec).

3.3.6 Auto-window length

The Auto-window length is used when Automatic Recording Stop is enabled. The recording will stop when the measured signal level is less than the trigger level for a continuous period of time whose length is defined by the Auto-window length. If Automatic Recording Stop is enabled, the minimum length of the captured waveform will be 0.25 sec (pre-trigger signal length) plus the value of the auto-window length.

3.3.7 Sensor check

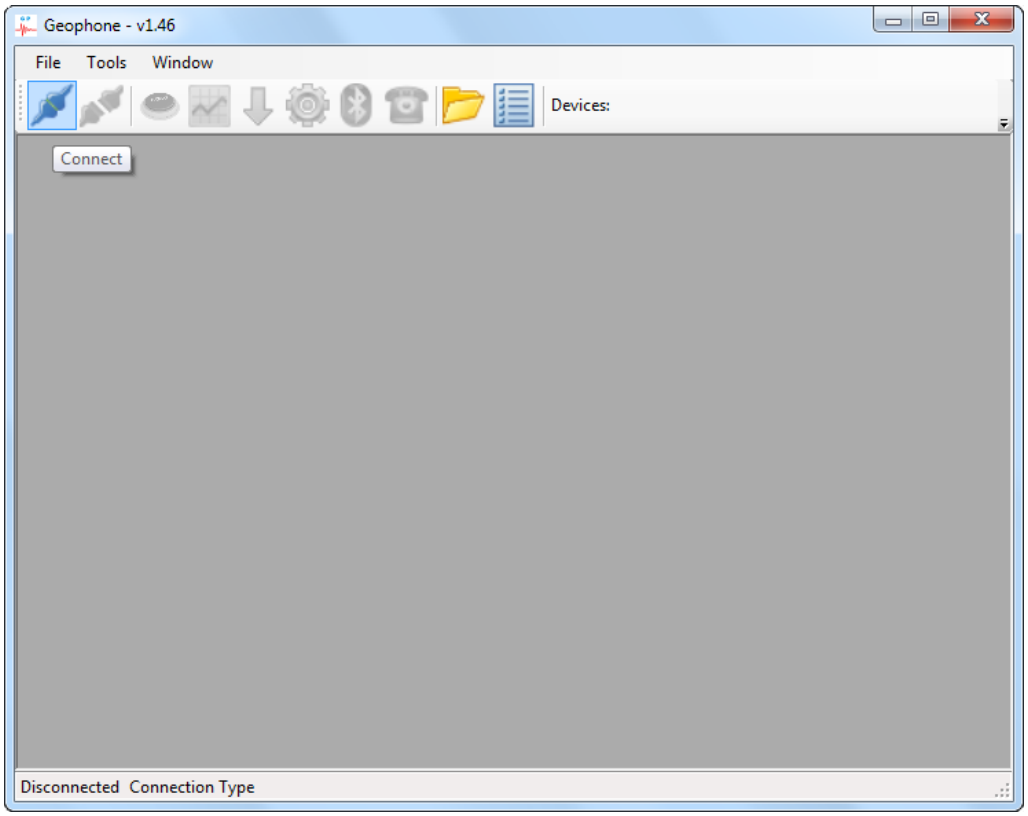
AutoBlast performs a sensor check on geophone sensors to determine the presence and the validity of the sensor signal. The sensor check can be enabled to perform the sensor check before monitoring is started or disabled. The sensor check can also be run manually by pressing OK when sensor check is displayed on the LED screen.

Sensor check mode	Description
Disable	Sensor check is not performed
Enable (Before monitoring)	Sensor check is performed at the time when the monitoring is initiated

If sensor check is enabled, AutoBlast will automatically perform a sensor check at the start of the monitoring. The sensor check data will be saved along with any event or histogram recorded during monitoring.

3.4 Connecting with PC

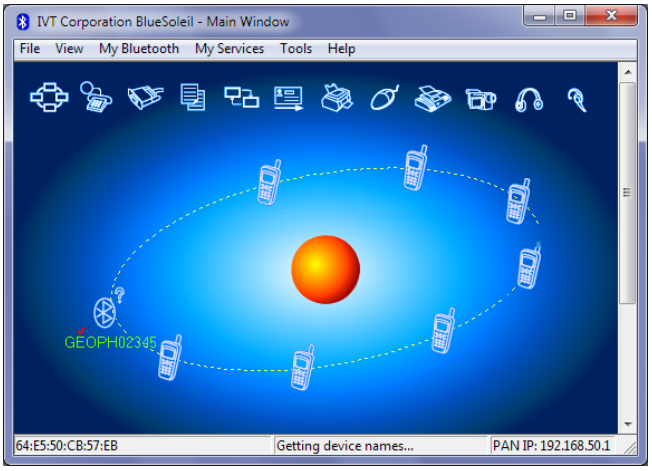
Connect the AutoBlast to the PC via Bluetooth or TCP/IP (Internet). Start the AutoBlast/Geophone PC software and click on 'Connect'.



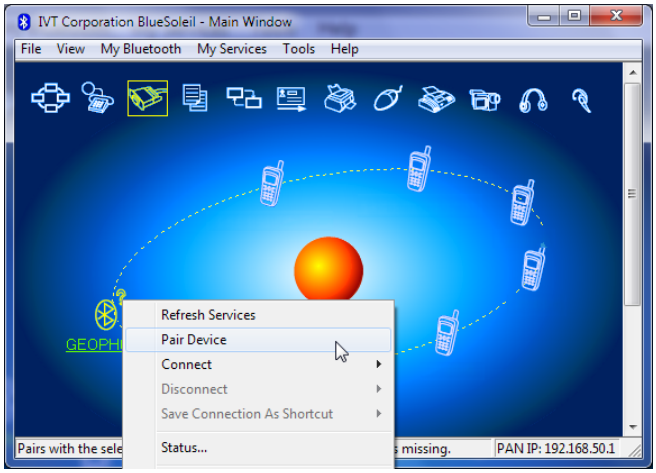
Once the connection dialogue box appears, select the appropriate connection type to establish the communication.

3.4.1 Connecting via Bluetooth

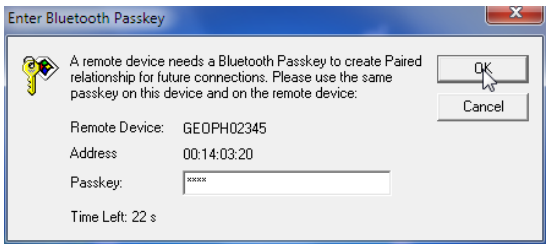
To connect to the AutoBlast via Bluetooth, the Bluetooth pairing will need to be established. Normally, the pairing is only required to be done once. To start the Bluetooth pairing, turn on the AutoBlast and use your computer to scan for nearby Bluetooth devices. The AutoBlast device should appear in the list of nearby Bluetooth devices as 'GEOPHXXXXX', where 'XXXXX' is the serial number of the device.



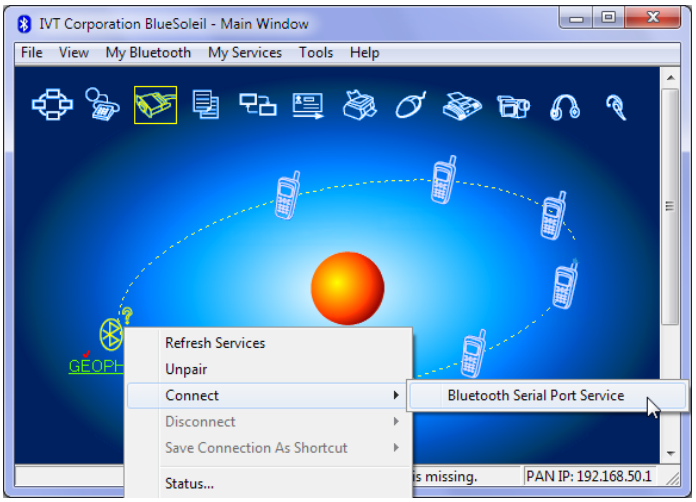
When the AutoBlast appears in the list of nearby Bluetooth devices, select the device and establish pairing.



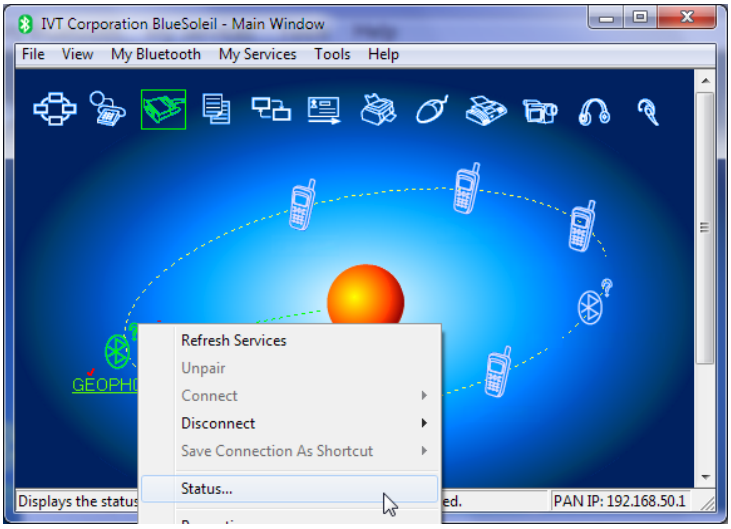
When prompted to enter the Passkey for the Bluetooth connection, enter '1234' as the passkey.

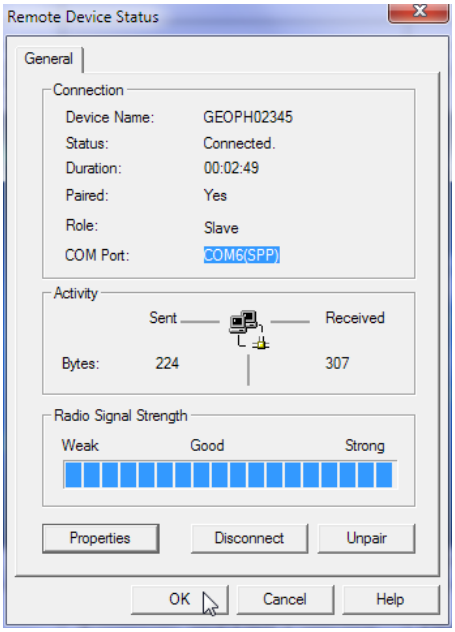


Once the pairing is done, click on the AutoBlast in the Bluetooth window and start the Bluetooth Serial Port service.

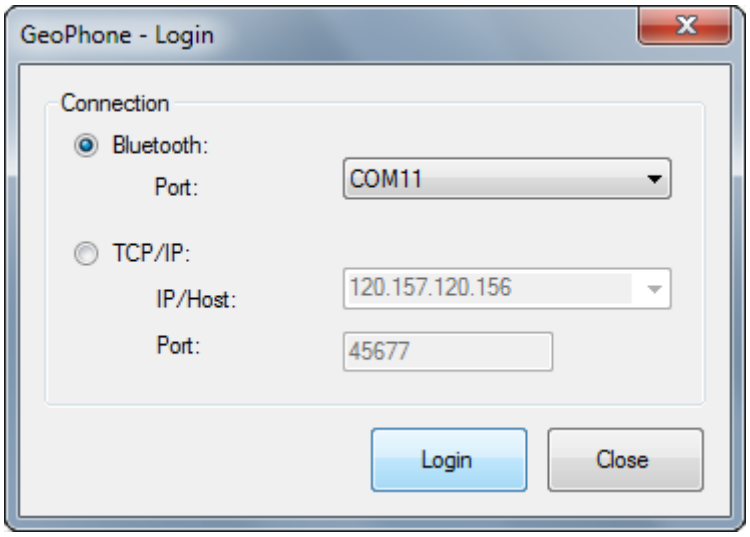


When the Bluetooth Serial Port service is started, the Bluetooth manager will assign a serial port number to the device. Note down the serial port number when the Bluetooth assigns to the AutoBlast device. If you are not sure about the Bluetooth serial port number, you may check the port number from the status or properties of the Bluetooth device.





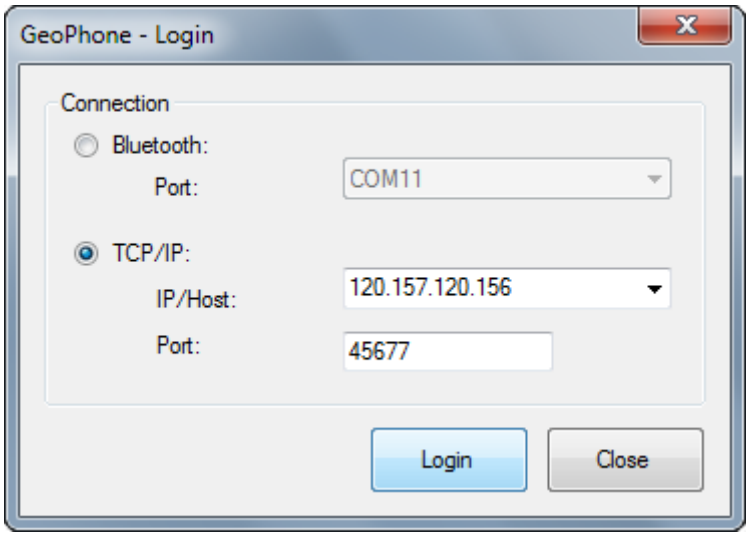
Once the Bluetooth pairing is completed, run AutoBlast PC software and select the connection type as ‘Bluetooth’ and set the port to the Bluetooth Serial Port number obtained during the Bluetooth pairing.



Click on Login to start the communication.

3.4.3 Connecting via TCP/IP (Internet)

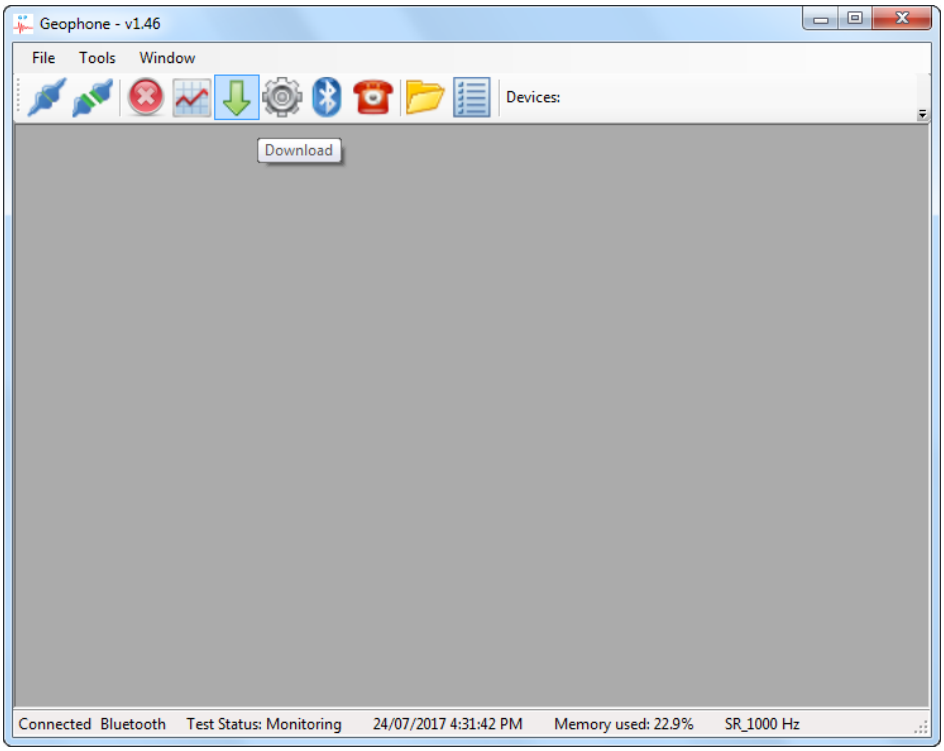
AutoBlast can be connected via the Internet using the IP address of the device. Before connecting to the device via the TCP/IP connection, make sure the device already configured as a server and that the listening port is known. When AutoBlast is configured as a listening server, the device will display its IP address on the LCD screen (see 0). Enter the IP address of the device as shown on the LCD and the TCP/IP port number at which the device is listening. Click Login to establish the connection.



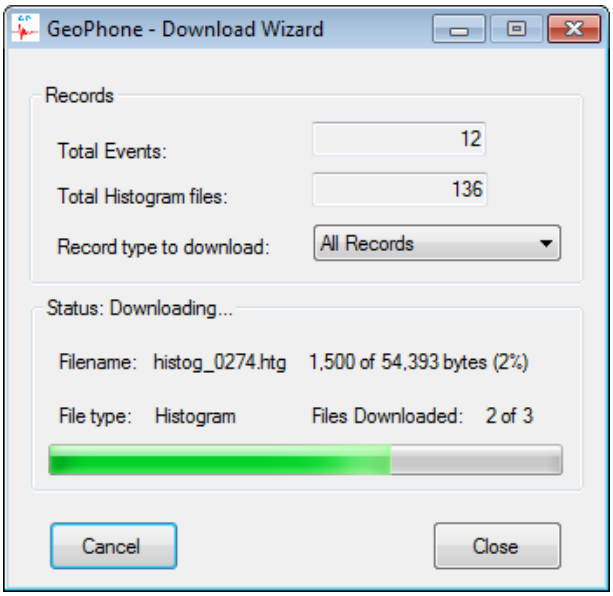
If the device does not display the IP address or the IP address is not acquirable, make sure the SIM card is inserted in properly and the modem's antenna is connected properly. Also, make sure the GPRS configurations and TCP server are already configured via Bluetooth.

3.5 Downloading

The waveforms and histograms stored in the AutoBlast can be downloaded via Bluetooth and TCP/IP. Before downloading the stored data on the device, make sure the device is connected to the PC. Click on 'Download' to open the download window.

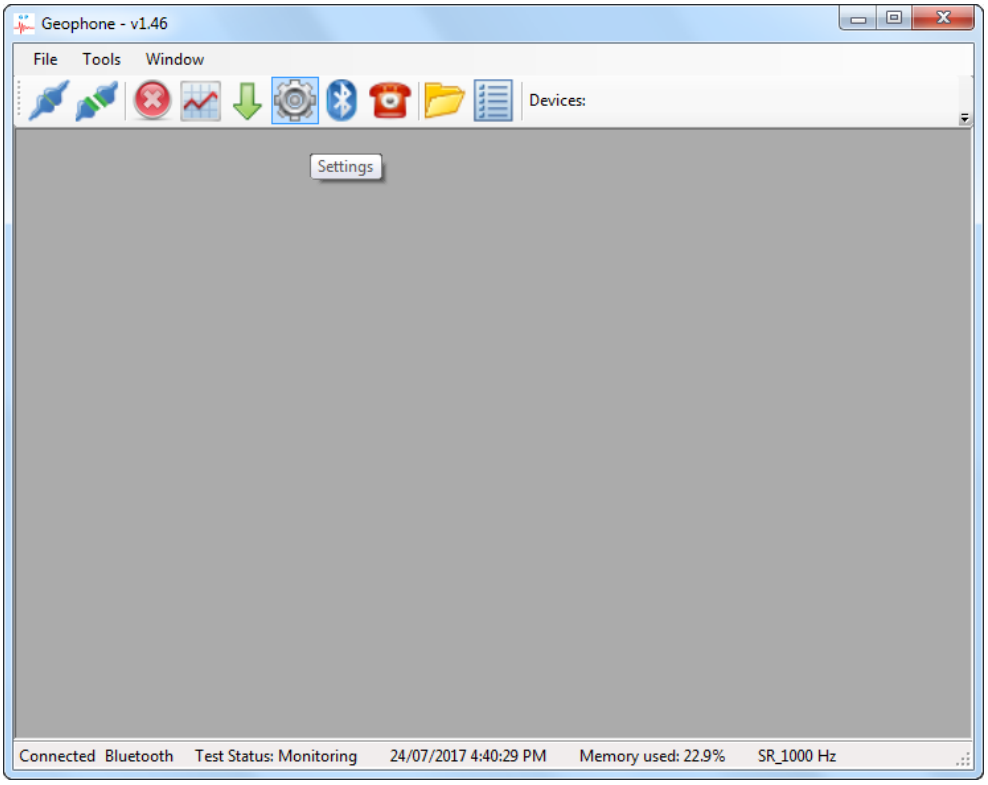


When the download window appears, click on Start to start downloading stored data. The downloading application will only search for the records/files that are not downloaded yet.



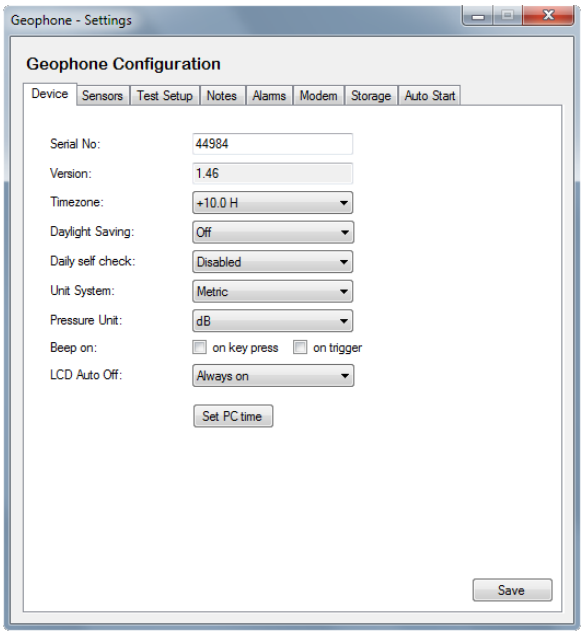
3.6 Configuration

The device configurations can be changed via the software once the device is connected to the PC. To open the configuration window, click on ‘Settings’.



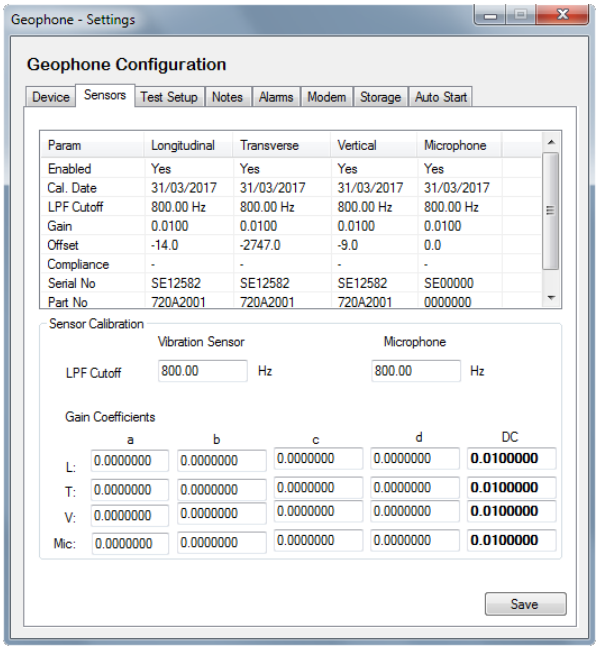
3.6.1 Device settings

The device configuration tab allows device related configurations to be changed.



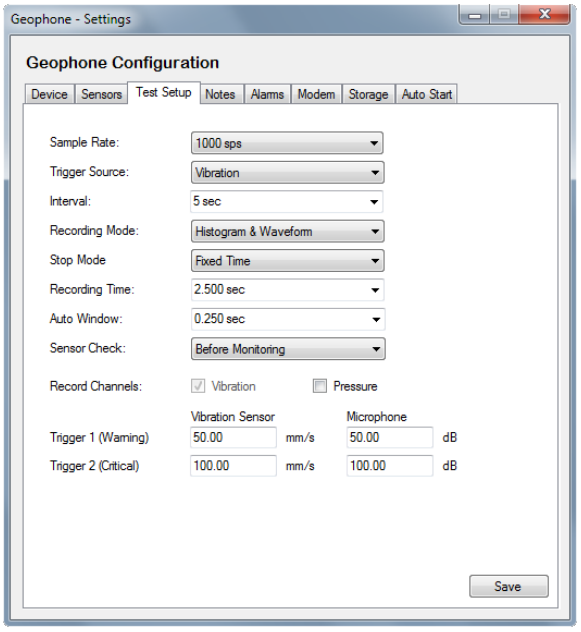
3.6.2 Sensor settings

The sensors tab displays an overview of the sensors' calibration and configuration data.

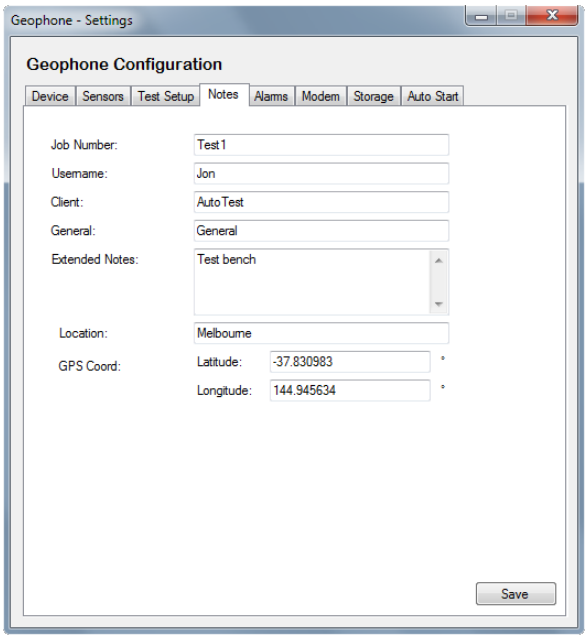


3.6.3 Test settings

The test setup tab allows test related configurations to be adjusted.

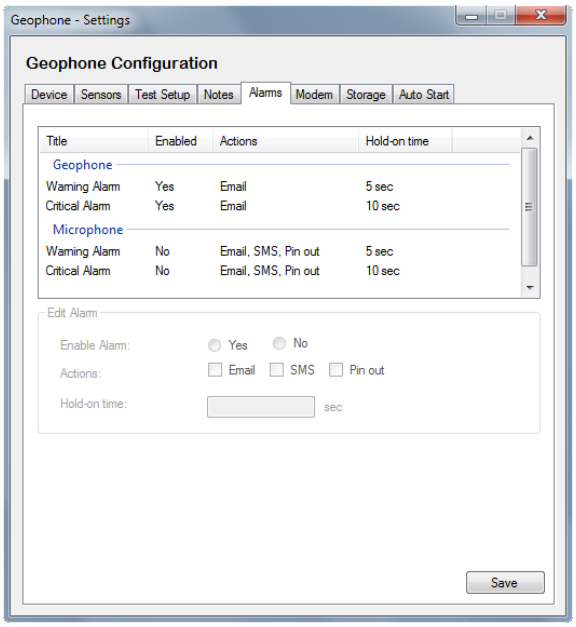


The notes tab allows users to set test notes on the device. The test notes will be embedded along with each histogram and waveform record in the future.



3.6.4 Alarms

The alarm tab allows the AutoBlast to alert the users via SMS, email or pin out (siren / strobe light) upon detecting a reading above the warning and/or critical trigger level set in previous tab (Test Setup).



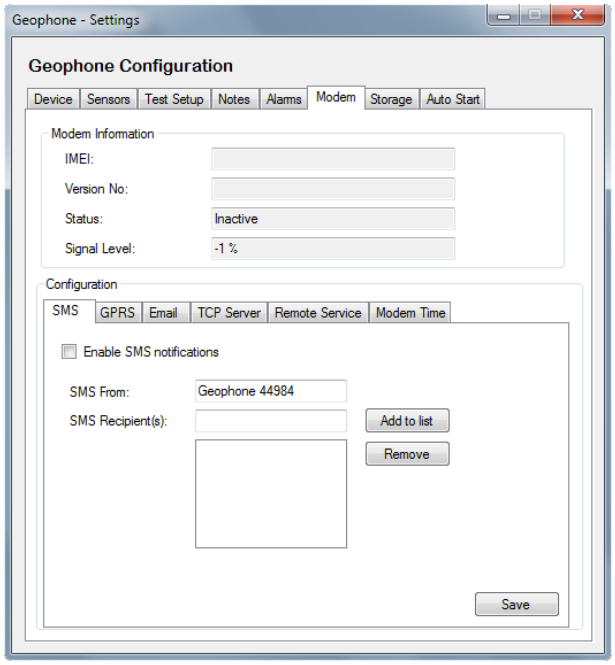
3.6.5 Modem

The modem tab allows users to control all things relating to the AutoBlast modem and its remote connectivity. The AutoBlast uses a 4G modem; please ensure that a correct mobile plan has been setup and tested before deploying the unit to be used in the field.

A typically modem setup would be; configure the device to make regularly connections back to a designated desktop / server where it will upload its data periodically. To achieve this, users will only need to change settings under the GPRS and Remote Service tab.

3.6.5.1 SMS

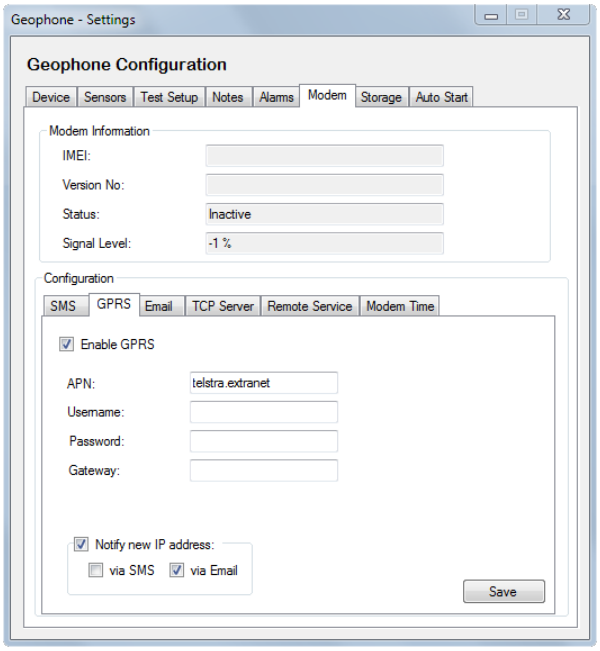
Any SMS notifications and/or alerts will be sent to all numbers added to the list. Similarly, by disabling SMS notification or clearing the list, no SMS will be send out from the unit.



3.6.5.2 GPRS

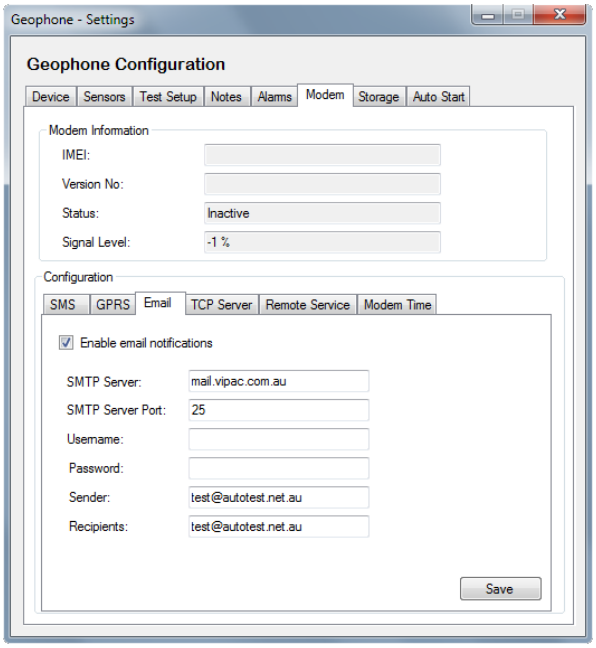
The GPRS tab configures how the modem connects to the internet via the mobile network. A typical APN for a Telstra SIM card is “telstra.internet”. However, if the mobile device is required to act as a server, then a special type of APN may be required. For the example, a Telstra SIM card with the correct mobile plan (contact your mobile ISP) can use “telstra.extranet”.

The checkbox “notify new IP address” option can alert users via SMS or email whenever device’s IP address has changed. This is particularly important if the user need to connect to the device on demand remotely.



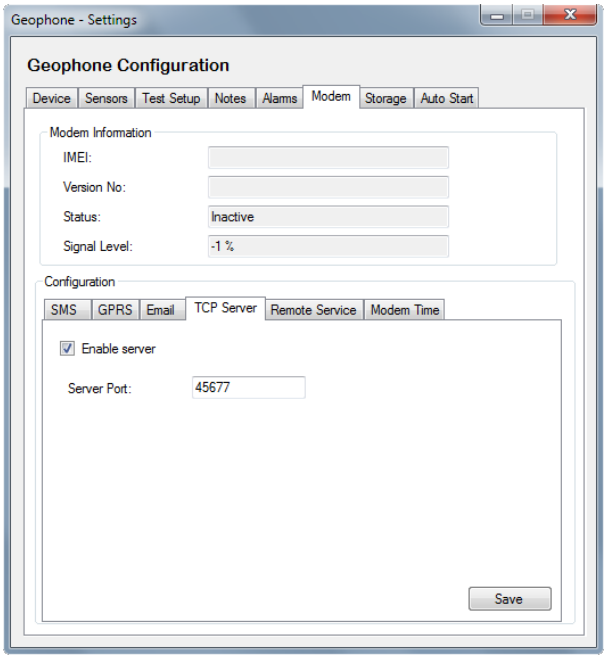
3.6.5.3 Email

The email tab allows users to designate 1 email address where all emails are to be sent to.



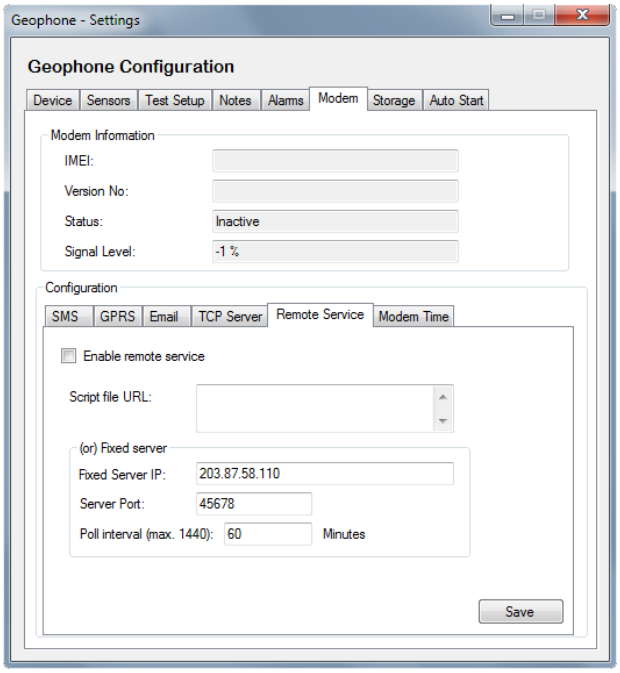
3.6.5.4 TCP Server

The TCP server tab allows the device to be configured as a server (listening) mode. Please ensure that the appropriate APN value has been set before enabling.



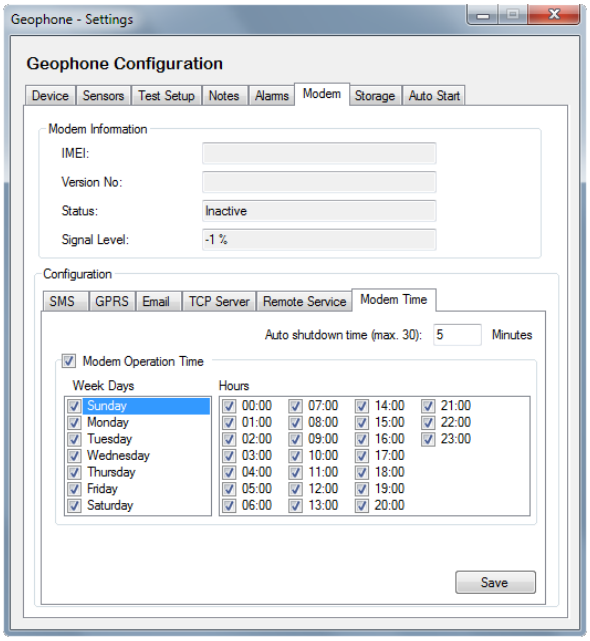
3.6.5.5 Remote Service

The Remote Service tab configures the server or destination IP address which the device will make regular connections to. The poll interval refers to how often the device tries to connect. For example, the poll interval is set to 60 minutes then an attempt to connect will occur every hour.



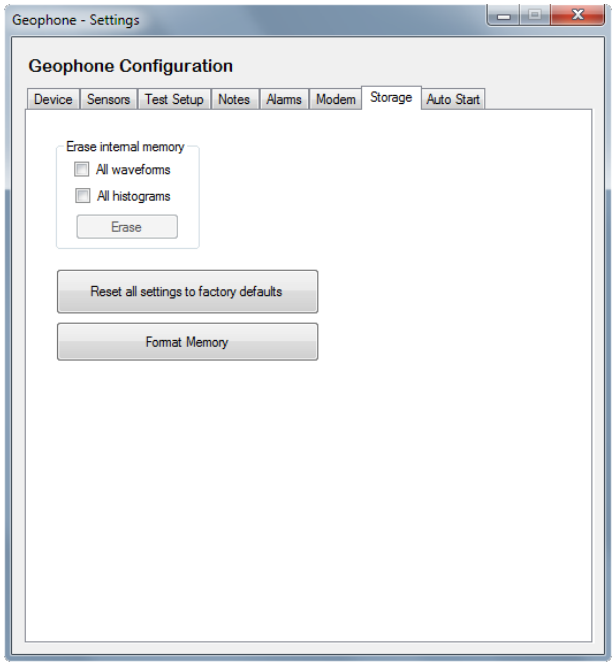
3.6.5.7 Modem Time

The system is designed to save power by putting the modem in standby modem as much as possible. This tab allows users to decide the duration of which the modem remain awake “Auto shutdown time” and when to wake up the modem from standby.



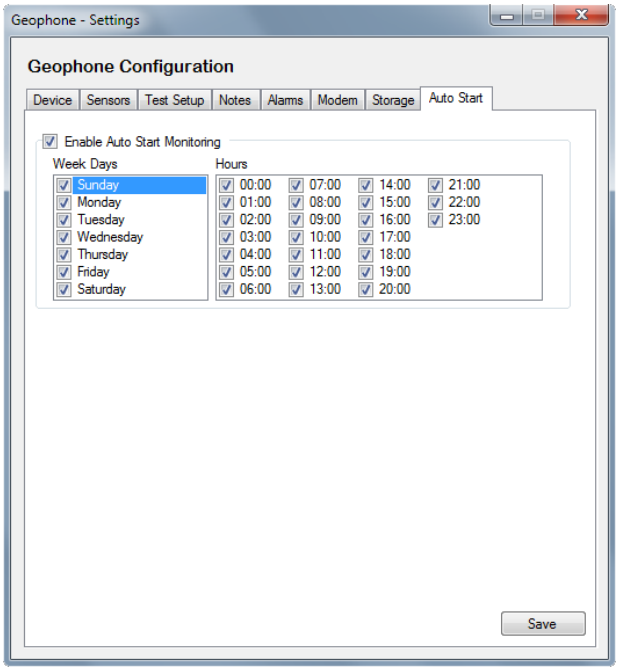
3.6.6 Storage

The storage tab allows users to clear all the data stored on the device to free up memory, as well as clearing and restoring all configurations back to factory default state.



3.6.7 Auto Start

This tab allows users to schedule in when the device should begin monitoring.



4 PRODUCT SPECIFICATIONS

Vibration		
Range	Up to 250 mm/s	
Resolution	0.0077 mm/s	
Accuracy	± 5% or ±0.5 mm/s	
Frequency range	1 to 180 Hz	
Acceleration	Calculated from captured waveform	
Trigger levels	0.13 to 250 mm/s	
Air Overpressure Monitoring		
Weighting scales	ISEE Linear	
Range	88 to 145 dB (500 Pa peak)	
Resolution	0.0152 Pa	
Frequency Response	2 to 250 Hz	
Accuracy	± 10% or ± 1dB	
Trigger level	100 to 145 dB in steps of 0.1dB	
Sampling rate	50, 100, 200, 400, 500, 800, 1000, 1600, 2000 samples/sec for each channel	
Real-time Clock (RTC)	Built-in clock with backup battery	
Storage space		
Full waveform recording	400 events (at 1000 Hz, 1.25 sec length, 4 channels)	
Histogram recording	21 days (at 5 sec interval) for 4 channels 30 days (at 7 sec interval) 270 days (at 1 min interval)	
Full waveform and histogram (Mix Mode)	30 days (at 1 min interval) 400 events (at 1000 Hz, 1 sec length)	
Modem	LTE (Bands: 1, 3, 5, 7, 8, 28) UMTS/DC-HSPA+ (850/900/1900/2100) GSM/Edge (850/900/1800/1900)	
Bluetooth	Bluetooth Class 2 with embedded antenna	
PC Connectivity via		
Bluetooth	Bluetooth class 2 (range: 3 m)	
GPRS (Internet)	TCP/IP (Internet)	
FFT Analysis	via PC software Australian 2187.2-1993 Standard	
User interface	1x16 character LCD with backlight	
Alarm notification	Alarm messages via email, SMS and external relay outputs	
Auxiliary Relay Output	2 Auxiliary relay outputs 12V 1A (12W)	
Battery Capacity	Internal 6V 7000 mAh	
Dimensions (w x h x d)	180 x 110 x 45 mm	
Operating temperature	-10º to +70ºC	
Humidity	Up to 90% non-condensing	
Supply Voltage	10 – 14 V	
Power consumption	50 mA	(Standby)
	100 mA	(Typical)
Warranty	12 months	

The replacement of any components must be carried out by AutoTest™ Products or an Authorised AutoTest Products Service Centre.

5 WARRANTY

To ensure prompt warranty service should it be required, please complete warranty registration form, and return to AutoTest Products Pty Ltd within 10 days of purchase of the product. AutoTest Products or an Authorised Service Centre warrants this product against defects in material and workmanship for a period of 12 months from the original date of purchase. This warranty applies only to products and components supplied by AutoTest Products which can be identified by the trade name or logo affixed to them or by other documents. AutoTest™ Products does not warrant any products not supplied by AutoTest Products.

During the warranty period, AutoTest Products or an Authorised Service Centre will repair (or at its option replace), any defective component(s) without charge for labour, provided the product is returned in its original or suitable equivalent container, freight prepaid, to an authorised AutoTest Service Centre. Transit insurance and return freight will be at the owner's expense.

In order to obtain calibration, warranty or non-warranty service, ship the product, freight and insurance prepaid to your nearest AutoTest Service Centre. Attach to the product your name, address, contact numbers, description of the problem and if a warranty claim, proof of purchase (dated sales receipt or invoice). AutoTest Products or an Authorised AutoTest Service Centre reserves the right to refuse warranty repair if accident, abuse, misuse or misapplication has damaged the product in transit or as a result of service or modifications by other than an Authorised Service Centre, nor are any other warranties expressed or implied, including any regarding merchantability or fitness for any other particular purpose.
AutoTest Products or an Authorised Service Centre is not responsible for incidental or consequential damages resulting from the breach of any express or implied warranty, including damage to property and, to the extent permitted by law, damages for personal injury.